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ABSTRACT

One of a series of pre-apprenticeship phase 1 training modules dealing with math skills, this self-paced student module covers decimals, addition, subtraction, multiplication, and division. Included in the module are the following: cover sheet listing module title, goals, and performance indicators; introduction; study guide/check list with directions for module completion; information sheet; self-assessment; self-assessment answers; and post assessment. Emphasis of the module is on computations relating to trade occupations problems. (Other related pre-apprenticeship phase 1 training modules are available separately--see note.) (MN)

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ED217290

INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP
PHASE I TRAINING

MATH

DECIMALS

Addition
Subtraction
Multiplication
Division

CE 032 926

## Goal:

The student will know the necessary math concepts in addition, subtraction, multiplication and division of decimals to enable him or her to compute math problems in which these concepts are used.

## Performance Indicators:

Given a series of math problems in the Self Assessment and Post Assessment portions of this module, the student will be able to compute the answers.

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# Introduction

Decimal fractions--usually called simply"decimals" are fractions in which only the numerator is expressed, the denominator being understood to be ten or some power of ten (100,1,000, or 10,000, for example). In a decimal fraction, the value of the unexpressed denominator is indicated by the number of places to the right of the decimal point that are occupied by the expressed numerator. If the numerator occupies only one place to the right of the decimal point, the denominator is understood to be ten (0.5 = 5/10). If the numerator occupies two places to the right of the point, the denominator is understood to be 100 (0.58 = 58/100); if the numerator occupies three places to the right of the point, the denominator is 1,000 (0.703 = 703/1000); and so forth. Decimals, like common fractions, provide a means of expressing quantities that are less than one, but they have the advantage of being easier to work with than common fractions. However, in making calculations involving decimals, care must be taken to place the decimal point correctly; an error in placement results in a big change in the value of the decimal number.

Skill in working with decimals in needed for many of the computations relating to trade problems. Fractional parts of dimensions, weights, rates, and the like are often expressed decimally; and because the money system of the United States is based upon the decimal system, a thorough understanding of decimals is a requirement for estimating labor and materials costs, for ordering and billing, and for keeping financial records of all kinds.

# Study Guide

This study guide is designed to help you successfully complete this module. Check off the following steps to completion as you finish them.

STEPS TO COMPLETION

1. ____ Familiarize yourself with the Goal and Performance Indicators on the title page of this module.

2. ____ Read the Introduction and study the Information section of this module. It is intended to provide you with the math skills necessary to successfully complete the assessment portions.

3. ____ Complete the Self Assessment section of this module. You may refer to the Information section for help.

4. ____ Compare your Self Assessment answers with the correct answers on the Self Assessment Answer Sheet immediately following the Self Assessment exam. If you missed more than one of the Self Assessment exam questions, to back and re-study the necessary portions of the Information section, or ask your instructor for help. If you missed one or none of these problems, go on to step 5.

5. ____ Complete the Post Assessment section of the module. Show your answers to the instructor. It is recommended that you score 90% or better on those Post Assessment exams with 10 or more problems, before being allowed to go on to the next math module.

# Information

A decimal fraction is a fraction whcse denominator is 10, 100, 1000, 10,000 or any other value which is obtained by multiplying 10 by itself a specified number of times. Instead of looking like a common fraction, the decimal fraction is written on one line as a whole number with a period in front of it. This is possible because the denominator is always 1 followed by zeros. By placing a period before the number which appears in the numerator, the denominator may be omitted. This period is called the decimal point.

It is apparent that any whole number with a decimal point in front of it is a decimal fraction. The numerator is the number which follows (to the right of) the decimal point. The denominator is 1 with as many zeros after it as there are placed in the number to the right of the decimal point. These places are called "digits".

Examples: 4 7/10 = 4.7, 4 7/100 = 4.07, 43 67/1000 = 43.067

.63 is read sixty-three hundredths.
.136 is read one hundred thirty-six thousandths.
.5625 is read five thousand six hundred twenty-five ten-thousandths.
3.5 is read three and five tenths.
2.15625 is read two and fifteen thousand six hundred twenty-five hundred thousandths.
.0625 is read six hundred twenty-five ten-thousandths.

The use of the word and is to indicate the decimal point in a mixed fraction.

To round-off a decimal, check the drawing, sketch, or specifications to determine the required degree of precision. Look at the digit in the decimal place which indicates the required degree of precision. Increase that digit by 1 if the digit which follows immediately is 5 or more. Leave the digit as it is if the digit

which follows is less than five and drop all digits that follow.

To subtract decimals, write the given numbers so that the decimal points are under each other. Subtract each column of numbers the same as for regular whole numbers. Locate the decimal point in the answer by placing it under the column where it appeared in the problem.

To multiply decimals, multiply the same as with whole numbers. Total the number of decimal places to the right of the decimal point in both of the numbers being multiplied. To locate the decimal point in the answer, start at the extreme right in the answer and count off as many places to the left as there are in both the multiplier and multiplicant (the numbers being multiplied).

To change a decimal to a fraction, divide the numerator by the denominator.

To divide decimals, place the number to be divided (called the dividend) inside the division box. Place the divisor outside. Move the decimal point in the divisor to the extreme right. The divisor then becomes a whole number. Move the decimal point the same number of places to the right in the divident (this may involve adding zeros if it has fewer digits than the divisor). Mark the position of the decimal point in the quotient directly above the decimal point in the divident. Divide as whole numbers. Divide as whole numbers and place each figure in the quotient directly above the digit involved in the dividend. Add zeros after the decimal point in the dividend if it cannot be divided evenly by the divisor. Continue the division until the quotient has as many places as are required for the answer.

# Self Assessment

Write each of the following as decimals.

Seven tenths
Sixteen hundredths
Fifteen thousandths
Eleven ten-thousandths
Two thousand one hundred fifty-two thousandths

Write the following as decimal fractions.

3/10 9/100 93/1,000 157/10,000 1,000/10,000 1,027/10,000

Express the following decimals in words.

.3
.07
1.25
0.3125
5.375
27.01563
4.0013

A 1" x 1" x 1/8" steel bar will weigh .38 pounds per foot. What is the weight of a 20' bar?

# Self Assessment Answers

Decimals:

seven tenths = .7

sixteen hundredths = .16

fifteen thousandths = .015

eleven ten-thousandths = .0011

two thousand one hundred fifty two thousandths = 2.152

Decimal fractions:

3/10 = .3  9/100 = .09  93/1,000 = .093  157/10,000 = .0157  1,000/10,000 = .1000

1,027/10,000 = .1027

Decimals in words:

.3 = three tenths

.07 = seven hundredths

1.25 = one and twenty-five hundredths

0.3125 = three thousand one hundred twenty-give ten thousandths

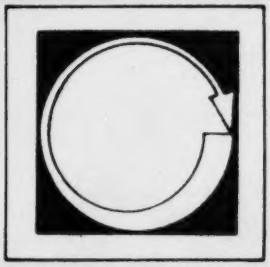
5.375 = five and three-hundred seventy-five thousandths

27.01563 = twenty-seven and one thousand five hundred sixty-three hundred thousandths

4.0013 = four and thirteen ten-thousandths

weight = 7.6 pounds

# Post Assessment



Listed below each problem are four possible answers. Decide which of the four is correct, or most nearly correct; then write the letter for that answer in the blank to the left of the problem.

1. ____ What is the sum of the decimal numbers 6.5, 7.321, 93.21 and 0.0125?

   a. 10.7043
   b. 10.71245
   c. 107.0435
   4. 1,070.435

2. ____ What is the remainder when 35.70 is subtracted from 76.853?

   a. 41.153
   b. 411.53
   c. 764.96
   4. 7,649.6

3. ____ What is the product of 35,000 X 0.007?

   a. 21.00
   b. 21.50
   c. 24.50
   d. 245

4. ____ What is the quotient when 81,000 is divided by 0.009?

   a. 81.009
   b. 8,100.9
   c. 90,000
   d. 9,000,000

5. ____ What is the result when the product of 0.0064 X 800 X 160 is divided by the product of 400 X 0.00016?

   a. 12.80
   b. 1,280
   c. 12,800
   d. 128,000

6. ____ A floor-covering subcontractor used 799 sq. yd. of linoleum on a large job. At $2.236 per square yard, what was the cost of the linoleum used on the job?

   a. $178.65
   b. $1,786
   c. $1,786.56
   d. $17,865

7. ____ A house with a floor area of 1,860 sq. ft. is estimated to cost $18,042. What is the cost per square foot?

   a. $9.16
   b. $9.70
   c. $9.85
   d. $9.95

8. ____ The cost of excavating a basement is $319.50. If the volume excavated is 150 cu. yd., what is the cost per cubic yard?

a. $2.03
b. $2.13
c. $2.23
d. $2.31

9. ____ A contractor buys 2 1/2 rolls of Brand A carpet, 5 3/4 rolls of Brand B, 6 1/4 rolls of Brand C, 3.87 rolls of Brand D, and 9.89 rolls of Brand E. How many rolls does he have altogether?

a. 14.13
b. 24.26
c. 28.13
d. 28.26

10. ____ What is the estimated cost of a house with floor area of 1,728 sq. ft. at $8.75 per square foot?

a. $14,960
c. $15,120
c. $16,240
d. $18,220